National Weather Service

La Crosse, Wisconsin

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Inside this Issue:

2009 Shareholder's Report

National Weather Service, La Crosse, WI

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Your Local National Weather Service: Return on Your Investment

Welcome to the third edition of the National Weather Service (NWS) La Crosse Shareholder's Report. We are pleased to bring you this report in an effort to highlight the service and information provided by NWS La Crosse personnel, as well as the efforts made to enhance those services during this past year. I hope you find this information informative and useful.

"Dedicated to *continuous improvement* in the provision of high quality weather-related warning, forecast and educational information for the safety and overall benefit of the citizens we serve."

This has been the NWS La Crosse Mission Statement for over 10 years, and it reflects the perspective taken by our office staff to consistently find ways to *improve* the scientific, technological and service-related programs of this office. Our local Mission Statement builds on the NWS Mission to "...provide weather, hydrologic and climate forecasts and warnings...for the protection of life and property and enhancement of the national economy." I believe the articles included in this Report demonstrate that continued commitment to quality and improvement!

The NWS La Crosse staff

How important is the weather information provided by your tax dollars? The 2008 NOAA Economics Report indicates the following:

"Total annual Federal spending for weather information returns an annual benefit-cost ratio of 4.4 to one to U.S. households. This does not include benefits in agriculture, transportation, or construction."

That amazing statistic reinforces the overall value of both day-to-day and significant event weather information to all sectors of the population.

In this edition of the Shareholder's Report, a number of articles will provide specific examples of how our office is enhancing the value you all receive from our day-to-day work. In particular, our efforts to provide earlier and enhanced information for our weather warning partners has been a prime focus of change during this past year.

I hope you find our work demonstrates the sort of stewardship you expect from your public servants. I welcome your comments regarding how we can provide an even better investment for you!

Glenn R. Lussky
Meteorologist in Charge (MIC)

Utilizing Forecast Confidence in Pre-Event Decision-Making

Two large winter storms impacted the Midwest during December 2009. Both had unique setups and evolution that provided the La Crosse NWS staff with challenges.

The blizzard/winter storm that impacted the area on December 8-9 was easily predicted. Nearly all computer models were in good agreement as the storm approached, consistent in the path and intensity of the storm. We were also certain the precipitation would stay as snow and provide widespread accumulations of 7 to 14 inches, along with intensifying winds leading to poor visibilities and significant drifting.

Warnings were issued far in advance for the December 8-9 storm and people heeded the message. Many partners commented on how this helped them make better decisions in their roles. The Fillmore County, MN, Sheriff Department stated, "I'm told that they [dispatch] received a noticeable decrease in the volume of calls and incidents. I believe your early warnings, updates and status of this storm played an important role in minimizing

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Effectively Applying Training to Operations

The NWS La Crosse staff takes training seriously. Every year, the operational personnel review old and new scientific research and develop ways to apply that information in the forecast process. Through drills, quizzes, seminars, and displaced real-time weather simulations, the staff prepares for each weather season and reviews skills in each program area to maximize our forecast and service performance.

2009 Verification Scores	National Goal	National	Regional	La Crosse
Tor Lead Time	12.0	11.6	11.1	15.2
Tor Detection	69%	66%	66%	71%
Tor False Alarm	72%	78%	76%	75%
Winter Detection	90%	88%	88%	93%
Winter Lead Time	15.0	17.8	18.3	19.1
Fl Fld Detection	90%	91%	92%	95%
Fl Fld Lead Time	49.0	68.1	80.8	95.8
Avn Detection	64%	64%	64%	63%
Avn False Alarm	43%	37%	36%	34%

This training effort is the foundation on which our day-to-day and severe weather operations are built. Does it make a difference?

The Table (left) shows the verification results from nine separate metrics tracked by the NWS and used by Congress to measure NWS operational performance.

In 2009, the NWS La Crosse office met 7 of the 9 national metrics tracked for performance. For the other two, we fell just short of the goal. The NWS Central Region met 5 of the 9 metrics, while NWS-wide, offices also met the goals on 5 of the 9 metrics. Overall, *the NWS La Crosse improved the verification scores for the nation and the region on 8 of the 9 metrics,* and failed to do so on the last metric by just one percentage point.

Quality training and high level effort to apply the training to operational processes does make a difference. We're pleased that our hard work in this area is reaping benefits for the citizens we serve!

Table information: Tor Lead Time is the average warning lead time for observed tornadoes (in minutes). **Tor Detection** is the percentage of observed tornadoes that had tornado warnings. **Tor False Alarm** is the percentage of tornado warnings that did not have tornadoes. **Winter Detection** is the percentage of winter storms (per county) that had winter storm warnings. **Winter Lead Time** is the average warning lead time for observed winter storms (in hours). **Fl Fld Detection** is the percentage of flash floods (per county) that had flash flood warnings. **Fl Fld Lead Time** is the average warning lead time for observed flash floods. **Avn Detection** is the percentage of events with IFR conditions (less than 1 mile surface visibility and/or cloud ceilings of less than 1000 feet). **Avn False Alarm** is the percentage of IFR forecasts that did not have IFR conditions. Those goals that were met are highlighted in yellow.

High Water Marked By Signs

Severe flooding is a part of history for many communities in the region. Still, many residents are not fully aware of flood potential in their area. To help raise awareness and to commemorate the historic and terrain altering floods of June 2008, the NWS obtained signs which "mark" the high water level in several communities to increase public awareness of flooding potential.

"People who have lived through a severe flood will not soon forget its effects."

A total of nine high water mark signs were obtained for the La Crosse NWS service area during the summer of 2009. Three of those signs have already been posted, with six more slated to be installed during the spring of 2010. Signs are already in place in La Farge and Steuben, Wisconsin, and Elkader, Iowa.

The remaining signs will be deployed at Viola, Readstown, Soldier's Grove, and Gays Mills along the Kickapoo River in Wisconsin, and also along the Upper Iowa River at Decorah and the Cedar River at Charles City, Iowa. While the signs are designed to commemorate a historical flooding event, they are also intended to raise flood safety awareness.

These signs serve as a reminder to maintain our vigilance when it comes to flood safety and preparedness now and in the future. A dedication ceremony will be held to announce these signs once installed.

People who have lived through a severe flood will not soon forget its effects, but these signs will raise the awareness of flooding dangers of for new residents and future generations.

For additional information on the NWS High Water Mark Sign Project, or to get your own sign, refer to the following website: http://www.weather.gov/os/water/high_water/.

High Water Mark sign at Steuben, WI

Hydrologic Outreach Efforts

In his role as the first Service Hydrologist stationed at the NWS La Crosse office (beginning March 2009), Mike Welvaert has made it a focus to reach out to the communities we serve and educate and inform them of NWS hydrology programs and services. In addition to several smaller gatherings, two large seminars were conducted this past year.

The Kickapoo River Valley Flood Seminar was held on July 22, 2009 in Readstown, Wisconsin. Presentations were given by the National Weather Service, U.S. Army Corps of Engineers, U.S. Geological Survey, North Central River Forecast Center, Wisconsin Department of Natural Resources, County Emergency Management, Wisconsin State Emergency Management and the University of Wisconsin Department of Geography. Attendees included many representatives from the local communities, including city/town governments and emergency responders, as well as radio, television, and print media, Assembly and State Representatives, Natural Resources Conservation Service, and local environmental groups.

60 people attended the Kickapoo River Valley seminar.

The goal of these seminars was to gather the various user groups together for an exchange of information. There are many different user groups interested in and collecting a variety of river data. But these data are generally collected and utilized for that specific group's own interests. Some groups are even collecting the same or similar data.

It was hoped that by bringing these groups together, a relationship might develop to utilize resources more effectively through enhanced collaboration and data sharing. Those in attendance seemed to agree that the interactions were worthwhile, with productive information sharing between user groups.

La Crosse Service Hydrologist Mike Welvaert (in blue) speaks with attendees.

The challenge from here is identifying how we can all work together better in the future, especially leading up to and including the next flood event. We all want to be as prepared as possible to protect lives and property by using all information available from the various partner groups.

Open House Showcases Technology and Science

The La Crosse National Weather Service hosted a 5-hour open house in mid-September, three years from our previous open house. The entire staff was present to demonstrate our analysis and forecasting processes on our computer workstations,

"During the 4 NWS La Crosse Open House events (since 1995), nearly 3500 people have toured the facility."

discuss severe weather and our severe weather service program, demonstrate and discuss the importance of flood forecasting and warnings, and provide insights into various weather instruments, including Doppler radar.

We were fortunate to have valuable partners host additional exhibits as part of the open house, including the United States Geological Survey (USGS), amateur radio services, La Crosse County Emergency Communications, and Olmsted County Emergency Communications. Their participation demonstrated the cooperation required between the NWS and our partners, and allowed visitors to see what services they provide.

The open house was the 4th since the La Crosse NWS forecast office opened in 1995. During those four events, nearly 3500 people have toured the facility.

Meteorologists Jeff Raberding and Steve Thompson welcome visitors and answer initial questions as they being their tour during the 2009 open house

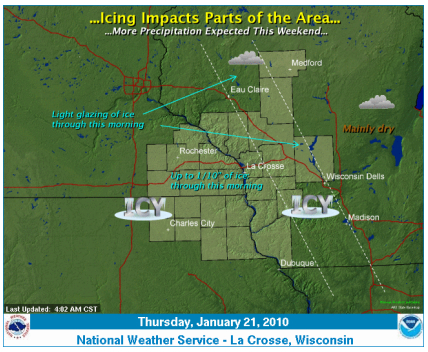
Utilizing Forecaster Confidence (continued from page 1)

potential weather-related incidents." And from the Decorah Police Department, "People heeded the warnings and stayed off the roads. That really helped us out."

On the other hand, the winter storm that moved through the area just before Christmas was much more challenging. Forecaster guidance was inconsistent and the storm had the possibility of mixed precipitation types. Knowing this storm would be far more complex, the La Crosse NWS staff stressed lower confidence in projections and briefed partners on the wide variety of potential outcomes that could evolve.

In reality, some snow and ice impacted the area the first night but, after that, milder air moved in from the south and brought much warmer temperatures into the area. This changed the remaining precipitation over to mainly rain, which made for much better travel conditions than many locations just to our west experienced. The storm had fairly minimal impact in our area while, further to the west and north where colder air stayed in place, snowfall was very heavy and travel was nearly impossible.

Enhancing Support to Partner Agencies



The "Weather Story" graphic produced by NWS offices is widely used by partners to get a quick look at expected weather events that may require safety-related actions.

One area where the National Weather Service is greatly expanding its focus is in its efforts to improve and enhance decision-making support for all our partnering agencies. The reason for this is clear. It doesn't matter how good the forecast or warning is if that information isn't communicated effectively to those who need to make critical decisions related to the impact of the weather event.

As technology and the understanding of our atmosphere increases, we are able to provide more, better, and earlier information than 5 or 10 years ago. This information can be used to help the public plan for weather events and make educated decisions which positively impact public safety. For example, this past winter season, enhancements in our pre-event conference calls and webinars with partner agencies have led to cancellation of schools *the day before the event*, based on the forecast and the forecaster confidence in the *impact of the event*.

This growing emphasis on how weather will impact people is increasingly being integrated into in the forecast information we provide, over and above just predicting the type and duration of weather. Ultimately, this information advances public safety through the enhanced information made available in our expanded collaboration efforts with the NWS weather safety partners.

Expanding Weather-Related Education and Safety

The La Crosse National Weather Service continues to place a high importance in conducting outreach, especially with partner groups that routinely work with us. In 2009, nearly 350 contacts, interviews, presentations, or booths were supported during the year by various staff members including booths at the La Crosse Boat, Sport, and Travel Show, the Deke Slayton Airfest, and various fairs and conferences.

Emergency teams review procedures during the simulated tornado event at the BNSF site.

One example of our outreach and preparedness work in 2009 that included local community involvement was a drill with Burlington Northern Santa Fe (BNSF) railroad. This drill simulated a case of a tornado hitting the BNSF rail yard in La Crosse during the daytime, when workers are out in the yard and several loaded trains are in the tornado path. Tornado warning notification plans were reviewed, along with tornado shelters on the property. Once the drill was completed, actions were reviewed and suggestions were created so they are better prepared, should an actual event occur.

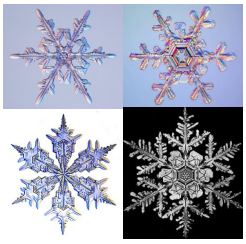
The NWS is privileged to work with businesses and groups as they prepare to make sound weather-related plans and decisions. *Your* local NWS office is similarly ready to assist you, ensuring your awareness of important considerations, including information and services available from the NWS.

Snow Accumulation: Impact of Snowflake Type

One of the significant advancements that has been made related to snowfall accumulation during the past few years is being able to forecast the impact of snowflake type on snowfall amounts. While all snowflakes or snow crystals are hexagonal, they grow differently based on the amount of water vapor (water in the gas form) available and the ambient air temperature. If ice crystals grow in an environment of abundant water vapor *and* temperatures between 0F and 10F, they grow quite large and complex, forming stellar dendrites. These dendrites (seen at the right) can produce 25 to 30 inches of snow for every one inch of liquid water used to build them. In other temperature/water vapor regimes, ice crystals can grow into needles or columns.

The most common ice crystal or snowflake is a combination of many types and is termed *irregular*. The irregular, needle, and column types only produce 10 to 12 inches of snow for every one inch of water used to create them. Stated another way, only one-half of the amount of snow would occur in those ice development conditions when compared to conditions which develop stellar dendrites.

The training program for operational meteorologists has recently concentrated on discerning expected crystal type, since the growth environment of the flakes has a profound impact on the total snowfall expected. The ability to apply this information helps meteorologists provide better snowfall depth forecasts for the public in advance of the event!



Examples of dendritic snowflakes; these large flakes can produce deeper snowfalls than other types of snow, relative to the amount of water in the ice

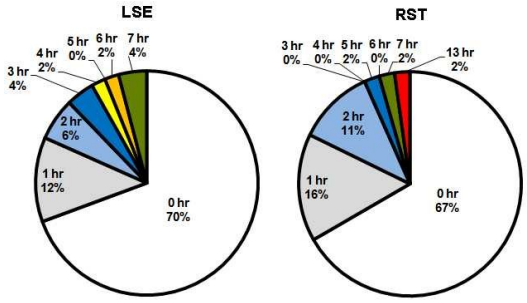
Local Research: Improving Aviation Forecasts During Light Snow Events

NWS La Crosse staff members perform weather research in a continuing effort to improve services and public safety. This article highlights one research area which has helped us improve our forecasts for aviation interests.

Using past observations from the La Crosse, Wisconsin and Rochester, Minnesota airports from 1961-1990, a snow database was constructed to assess Instrument Flight Rule (IFR) climatologies for snowfall events totaling 0.5 to 3.0 inches. Earlier research suggested 75% of light snow cases produced IFR conditions. The goal of this research was to determine the impact and behavior of falling snow on the onset of IFR conditions. From those events which produced IFR conditions, we learned that about 70% of the time, IFR visibilities commenced immediately at snow onset time. Approximately 90% of the events that produced IFR conditions did so within 2 hours of snow onset time.

These findings provide excellent foundational information for visibility forecasts related to measureable snowfall events. Specifically, when light snow is expected to accumulate, the forecaster (and pilot) can expect visibility will normally be reduced below 3 miles within 2 hours of the onset of the snow.

Other research performed by the WFO La Crosse staff is available on our local research web page (*http://weather.gov/lacrosse/research.php*). Questions regarding these local scientific studies may be directed to NWS La Crosse Science and Operations Officer Dan Baumgardt at: dan.baumgardt@noaa.gov.



Length of time between the onset of snowfall and the initiation of IFR flight conditions (visibility less than 3 miles or cloud ceilings below 1000 feet)

Awards, Recognition and Personnel Changes

Once again, 2009 was a year of accomplishment and innovation by NWS La Crosse personnel. In addition to the high quality day-to-day forecast and warning information provided by office staff members, staff members also contributed to improvements in various regional and national programs.

These efforts were again recognized through the NWS Cline Award process. The Cline Award is the highest regional and national award conferred by the NWS.

"For the 7th year in a row, the NWS La Crosse was recognized by having at least one of its employees selected as an NWS Central Region Cline Award winner."

Local La Crosse nominees contend for Regional Cline Awards against nominees from other regional forecast offices and regional office personnel. For the 7th year in a row, the NWS La Crosse office was recognized by having at least one of its employees selected as an NWS Central Region Cline Award winner.

This statistic is even more meaningful when considering the number of offices vying for these awards. The NWS La Crosse staff represents around 2% of all NWS Central Region personnel. With only 7 regional Cline Awards available each year, each forecast office should receive one Regional Cline Award every 7 years. The consistent recognition bestowed on the local staff members reflects the effort by the staff and the regional and national respect garnered for those efforts.

This year, Information Technology Officer Matt Davis received the Regional Cline Award in the area of "Engineering, Electronics and Facilities". Matt was recognized for contributions in multiple regional and national system development program areas, including improvements in our public web display of radar information, development of internal collaboration software, and design work with next generation NWS operational platforms. We're proud of the impact our office has had on national program improvements through Matt's efforts!

We're also proud that two of our staff employees were promoted this past year: Lead Forecaster Seth Binau to Science and Operations Officer at the NWS Office in Wilmington, OH, and Electronic Technician Matt Gasperich to Electronic Systems Analyst at the NWS Office in Aberdeen, SD!

New employees who have joined the staff during this past year include Lead Forecasters Andy Just and Tim Halbach and, most recently, Electronic Technician Nate Nelson. We are pleased to add these talented individuals to our staff!

If you see or talk to Andy, Tim or Nate, be sure to give them a special welcome to the local area from you as well!

Information Technology Officer Matt Davis, with his 2009 Regional Cline Award for Engineering, Electronics and Facilities

New Staff Members: Lead Forecaster Tim Halbach, Electronic Technician Nate Nelson, and Lead Forecaster Andy Just

National Weather Service
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Our Mission Statement

National Weather Service Mission

"Provide weather, hydrologic and climate forecasts and warnings… for the *protection of life and property* and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by others in the global community."

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Supercell Thunderstorm Damage in June/July 2009

The supercell thunderstorm is the most evolved, long-lived, and damaging of all thunderstorms and only lives in specialized wind and instability environments. Most supercell thunderstorms produce severe hail (over 1 inch in diameter) and/or severe winds (over 58 mph), though only 20 to 30 percent produce tornadoes. Many violent tornadoes are spawned from supercell thunderstorms. Around the Upper Mississippi River Valley region, we typically have 2-3 days per year with environments which support supercell thunderstorm development.

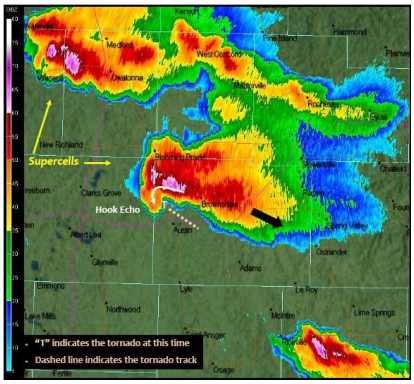

Fig.1. Two supercells show up clearly on WFO La Crosse Doppler radar on June 17, 2009. The supercell near Austin became tornadic near the time of this image.

In 2009, June 17 and July 24 had the right conditions to form supercell thunderstorms. On June 17th, the thunderstorms produced large hail and two tornadoes that impacted parts of northeast Iowa and southeast Minnesota. The largest tornado (EF2) tracked across the north and east sides of Austin, Minnesota, damaging several homes, buildings, and many trees (see Figure 1). The tornado was on the ground for 10 miles before lifting. Damage was several million dollars and there was one injury.

"On July 24th, 97% of the severe weather events had a warning in advance, with an average lead time of 28 minutes."

Hail as large as 3" in diameter heavily damaged crops and homes in parts of northeast Iowa and southeast Minnesota as well. Strong winds and isolated flash flooding were also reported.

The NWS La Crosse issued 17 total warnings, including 7 tornado warnings. For the EF2 tornado that affected Austin, the tornado warning provided at least 25 minutes of lead time for those living north of Austin. Other tornado warnings were issued for supercells in northeast Iowa; however, those storms failed to produce tornadoes. Strong rotation at the storm base was noted by spotters but no tornadoes occurred. This reflects the limits of our science and the still unknown details of the exact tornado formation process.

On July 24, 2009, several rounds of thunderstorms produced hail up to softball size and wind gusts to 78 mph across northeast Iowa, southeast Minnesota, and extreme southwest Wisconsin. These supercell thunderstorms were prolific hail producers, causing in excess of $250 million in damage to an estimated 400,000 acres of crops, mostly in Iowa. On a northwest to southeast running path in Iowa, section after section of land was stripped clean of its crops.

On the day after the event, crop damage was evident from space on high resolution satellite images starting west of Decorah, Iowa (Figure 2). In the image, damaged crops from the supercell's large hail appear dark as more soil can be seen from space, versus the nearly closed canopy of green healthy crops in the adjacent areas of northeast Iowa.

A radar view of one supercell thunderstorm that produced crop damage is shown in Figure 3 (near West Union) around 1:30 p.m. Approximately 110 severe weather reports were collected on July 24, with 24 warnings issued by the NWS La Crosse office. 97% of those severe weather reports had a warning in advance with an average of 28 minutes of lead time.

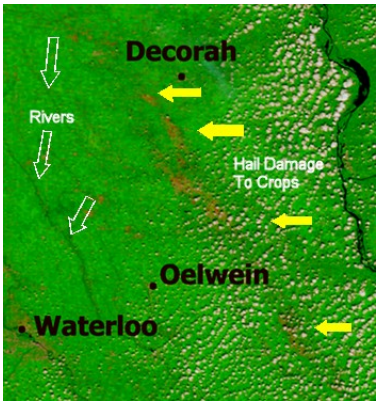

Fig. 2 (left). Significant hail damage is evident on high-resolution satellite images along the path of supercell thunderstorms, following the July 24, 2009 supercell event.

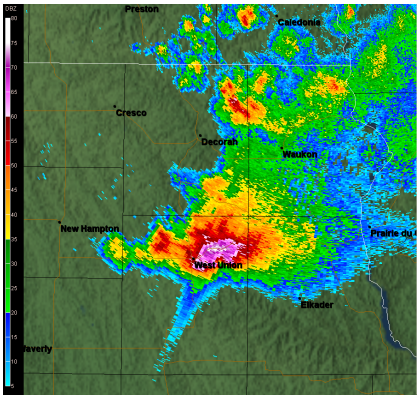

Fig 3 (right). A massive supercell tracks through northeast Iowa near West Union on July 24, 2009. This storm produced softball sized hail and wind gusts measured to 78 mph.